WHAT IS CLAIMED IS:

1. An optical scanning system, comprising:

a probe comprising:

a mechanical oscillator responsive to AC voltage signals; and

an optical fiber having a free end that executes an oscillatory scanning motion in response to being mechanically driven by the mechanical oscillator; and

a processor configured to receive measured intensities of light emitted from spots of a sample scanned by light from the free end of the optical fiber, the processor configured to assign intensities to image pixels based on the measured intensities of light in a manner that compensates for variations in the density of the scanned spots.

2. The optical scanning system of claim 1, further comprising:

a detector coupled to measure the intensities of light emitted by the scanned spots and to transmit the measured intensities to the processor.

3. The optical scanning system of claim 1, wherein the optical fiber has first and second resonant frequencies for oscillatory motion in respective first and second directions.

4. The optical scanning system of claim 3, further comprising a strut fixed to the fiber, the strut stiffening the free end more in the first direction than in the second direction.

5. The optical scanning system of claim 1, wherein the free end of the optical fiber has a non-axially symmetric cross-section.

6. The optical scanning system of claim 1, wherein the processor assigns an intensity to one of the image pixels that is an average of the measured intensities of light emitted by the scanned spots whose locations correspond to the one of the image pixels.

7. The optical scanning system of claim 1, wherein the processor selectively

assigns intensities to ones of the image pixels based on the measured intensities of light emitted by either first or last scanned spots corresponding to the ones of the image pixels.

8. The optical scanning system of claim 2, further comprising:

an optical system to focus the light emitted from the free end of the scan fiber to the spots and to route light emitted by the spots to the detector, the optical system including an element that transmits the light from the fiber end and reflects the light emitted by the scanned spots.

9. The optical scanning system of claim 2, further comprising:

an optical fiber that optically connects the remote probe to the detector.

10. The scanning system of claim 1, further comprising:

a source of pulsed light; and

a portion of transmission optical fiber to deliver the pulsed light from the source to the scan probe, the portion of transmission optical fiber being a multimode fiber.

11. A process for optically scanning a sample, comprising:

moving an end of an optical fiber along a path that crosses itself by driving the fiber with a mechanical oscillator;

scanning a plurality of spots in a sample with light from the moving end of the fiber; and

assigning intensities to image pixels based on measured intensities of light emitted by the scanned spots, the assigning including tracking numbers of ones of the scanned spots that correspond to ones of the image pixels based on locations of the scanned spots.

12. The process of claim 11, further comprising:

measuring the intensities of light emitted by the spots in response to being scanned.

13. The process of claim 12, wherein the scanning includes transmitting the light emitted by the moving end of the fiber through a material that selectively transmits scan light, and the measuring includes reflecting a portion of the light emitted by the scanned spots off the material.

14. The process of claim 11, wherein the assigning identifies the intensity of one of the image pixels with an average of the measured intensities of light emitted by the scanned spots corresponding to the one of the image pixels.

15. The process of claim 11, wherein the assigning identifies the intensities of ones of the image pixels with the measured intensities of light emitted by first ones of the scanned spots corresponding to the ones of the image pixels.

16. The process of claim 11, wherein the moving includes applying an AC voltage signal with a superposition of a first frequency and a second frequency to the oscillator, the first and second frequencies being near resonant frequencies for motion of the fiber in first and second directions, respectively.

17. A process of claim 16, wherein the assigning further comprises:

finding locations of the scanned spots from the AC voltage signal and identifying that one of the scanned spots corresponds to one of the image pixels based on the found location of the one of the scanned spots.

18. The process of claim 11, wherein the light emitted from the moving end of the fiber and the light whose intensities are measured have different wavelengths.

19. The process of claim 11, wherein the measured intensities include contributions from light emitted from the moving end and scattered by the scanned spots.

20. A process for operating an optical scanning system, comprising:

making an image of a sample by scanning spots in the sample, measuring

intensities of light emitted by the scanned spots, determining locations of the scanned spots, and assigning intensities to image pixels based on the measured intensities and determined locations of the scanned spots, the acts of determining depending on a value of an parameter;

selecting a new value for the parameter;

deciding whether the image of the sample has less double imaging if the new value of the parameter is used during the acts of determining; and

accepting the new value of parameter in response to determining that the new value produces less of the double imaging.

21. The process of claim 20, wherein the value of the parameter represents a phase difference between a scan motion of a fiber and a voltage signal driving the scan motion.

22. The process of claim 20, wherein the parameter represents a phase cross-coupling between scan motions of a scan fiber in two different directions.

23. The process of claim 20, wherein the parameter is a control voltage applied to a circuit, the circuit generating a signals whose values are representative of the locations of the scanned spots for corresponding values of the voltage signal driving the scan motion.

24. The process of claim 20, wherein the determining comprises:

receiving a voltage signal that drives the motion causing the scanning of the spots;

applying a phase lag to the voltage signal to produce a new voltage signal; and

using values of the new voltage signal as representative of the determined locations.

25. The process of claim 20, wherein the deciding includes determining whether distances between two image features that correspond to the same feature on the sample have decreased or increased.

26. The process of claim 20, wherein the determining depends on a value of a second parameter; and the process further comprises:

selecting a new value for the second parameter;

deciding whether the image of the sample has less double imaging if the new value of the second parameter is used during the acts of determining; and

accepting the new value of the second parameter in response to determining that the new value produces less of the double imaging.

27. The process of claim 20, wherein the amount of image doubling in first and second directions depend on the values of the first parameter and the second parameter, respectively.

28. The process of claim 20, wherein the act of deciding includes making a second image based on the new value of the parameter and comparing the second image to the first image.

29. A program storage device encoding a computer executable program of instructions for operating an optical scanning system, the instructions to cause the scanning system to:

make an image by scanning spots in a sample, measuring intensities of light emitted by the scanned spots, determining locations of the scanned spots, and assigning intensities to image pixels based on the measured intensities and determined locations of the scanned spots, the acts of determining depending on a value of an parameter;

select a new value for the parameter;

decide whether the image of the sample has less double imaging if the new value of the parameter is used during the acts of determining; and

accept the new value of parameter in response to determining that the new value produces less of the double imaging.

30. The device of claim 29, wherein the value of the parameter represents a

phase difference between a scan motion of a fiber and a voltage signal driving the scan motion.

31. The device of claim 29, wherein the parameter represents a phase cross-coupling between scan motions of a scan fiber in two different directions.

32. The device of claim 29, wherein the parameter is a control voltage applied to a circuit, the circuit generating a signals whose values are representative of the locations of the scanned spots for corresponding values of the voltage signal driving the scan motion.

33. The device of claim 29, wherein the instruction to decide causes the system to determine whether distances between two image features that correspond to the same feature on the sample have decreased or increased.